Original Article

Comparison of Single vs Multiple Doses of Antibiotic Prophylaxis in Reduction Post-Caesarean Section Infection Morbidity

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Abstract

Objective: This study aimed to compare single vs multiple doses of antibiotic prophylaxis in patients undergoing caesarean section to reduce morbidity linked with infection.

Methodology: A quasi-experimental study was conducted in the Department of Obstetrics and Gynaecology, Services Hospital, Lahore from 07-09-2019 to 06-03-2020 after approval from the ethical review committee. A total of 240 patients (120 in each group) were included in the study. Group A received a single dose of antibiotic prophylaxis and Group B was administered multiple doses of prophylactic antibiotics.

Results: Patients booked in the study had a mean age of 27.93±3.62 and 28.80±3.54 years in group-A and B, respectively. In group A, the mean gestational age was 39.21±0.70 and in group B, 39.27±0.69 weeks. In group A, 9 patients (7.5%) and in group B, 11 patients (9.2%) were primigravida while 111 patients (92.5%) in group A and 109 patients (90.8%) in group B were multigravida. Febrile morbidity was found in 8 patients (6.7%) in group-A and 6 patients (5.0%) in group B. (p=0.582). Postoperative wound infection was observed in 11 patients (9.2%) of the group and 8 patients (6.7%) of group B (p=0.473).

Conclusion: The study concluded that there was no statistically significant difference between the two groups, single and multiple doses, in terms of their effectiveness in reducing infections after a Caesarean section.

Keywords: Elective caesarean section, Febrile morbidity, postoperative wound infection.

How to cite: *Bushra N, Waheed K, Rashid T, Abbas A. Comparison of Single vs Multiple Doses of Antibiotic Prophylaxis in Reduction Post-Caesarean Section Infection Morbidity. MedERA-Journal of CMH LMC and IOD.2023; 5(1): 23-27*

DOI: *doi.org/10.5281/zenodo.8307467*

Introduction

Caesarean section is probably the most common surgical procedure carried out in the field of obstetrics. Infection morbidity is the most common complication following caesarean section with reported rates ranging from 18%-83%.[1] Women undergoing Caesarean section have a 5-20 folds greater chance of getting an infection compared with women who deliver vaginally.[2] Puerperal sepsis is still a major cause of maternal morbidity and mortality. In Asia, it is the second commonest cause of maternal mortality causing 11.6% maternal deaths.[3] It may present in the form of febrile morbidity, endometritis, cystitis, wound infection, and pelvic abscess. [4]

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Submission Date: 10-02-2023
1st Revision Date: 20-02-2023
Acceptance Date: 05-07-2023

Obstetricians all over the world are concerned about the emerging trend of caesarean section which resulted in hazards affecting the health care provision and to some extent is a question of maintaining clinical governance. Sepsis is the dominant cause of post-partum maternal morbidity and mortality and if proper measures are not taken it affects up to 50% of pregnant patients.[5] Pakistan is low resource country where such complications are adding cost to the patient due to increased hospital stay and at the level of the hospital setting to combat with the burden. The role of antibiotic prophylaxis is one of the important modalities in preventing surgical site infection.[6] WHO defines its surgical safety checklist that emphasizes the importance of antibiotics at the time of abdominal incision which has a marked role to reduce surgical site infection.[7]

The literature highlights the significant role of a single dose of antibiotics which is effective to avoid surgical comorbidity. It is noticed that in a few cases if more than one dose is given without any proper indication, resistant bacteria may develop that increases the stay at the hospital at the cost of hospital finances.[8] Study by Myerscough PR mentioned that septic complication was up to 30% and the wound was infected in 11% of those who received a single dose of antibiotics while it was 15.3% and 1.4% respectively in multiple-dose groups.9 Results of recent studies are entirely different. One recent study showed febrile morbidity at 20% in both groups, superficial wound infection at 4% in both groups and deep wound infection at 1% in the single-dose group and 2% in multiple-dose groups .[10]

The aim of this study was to evaluate the effectiveness of single-dose prophylactic antibiotics in elective caesarean section in patients coming to a tertiary care hospital as we are currently using prolonged antibiotic therapy in our patients. Most of the patients coming to a tertiary care hospital are malnourished, anaemic and have poor socio-economic status. Although literature already exists on the effectiveness of single-dose antibiotics for the population of pregnant patients coming to a tertiary care hospital it is a quite new study as the nutritional as well as educational status of our pregnant patients, antenatal counselling and care in our tertiary care hospitals does not meet international standards. So, if short antibiotic prophylaxis proves as effective as long antibiotic prophylaxis in our population of pregnant patients, it will change trends of using prolonged antibiotic regimens in tertiary care hospitals and in turn reduce financial burden for patients as well as hospital stay.

Methodology

A quasi-experimental study was conducted in the Department of Obstetrics and Gynaecology, Services Hospital, Lahore from 07-09-2019 to 06-03-2020 after approval from the ethical letter No. IRB/ 2014/59/ SIMS. The sample size was estimated to be 240 (120 in each group) using a 95% confidence level, and 80% power of test with expected febrile morbidity as 28.8% in single-dose group and 15.3% in multiple-dose group.[10] Inclusion Criteria were all booked patients for Elec-tive Lower segment caesarean section (EL LSCS) (20-35 years) with parity less than 4 and the number of previous sections not more than 2. The Gestational age included was > 38 weeks confirmed by the last menstrual period. Exclusion Criteria were Patients with placenta previa, preeclampsia, diabetes mellitus, and renal disease (on USG, BP > 140/90 mmHg on 2 occasions and protein 1+ on dipstick, GTT > and creatinine > 1.2 respectively). Patients with a previous history of gaped wounds after caesarean section were excluded. Recent administration of antibiotics within 7 days and patients having evidence of prelabour rupture of membranes (speculum examination) were also excluded.

All patients were admitted to the Antenatal ward of

Gynae Unit III Services Hospital Lahore following the study criteria. All patients were randomly allocated into two groups A and B. Group A received a single dose of prophylactic antibiotic i.e., 1 gm intravenous cefotaxime after umbilical cord clamping whereas Group B received the same 1 gm preoperative dose followed by two postoperative doses of 1gm I/V cefotaxime 12 hours apart and further 5 days regimen of oral cefixime post operatively. A standard operative technique was used for all caesarean sections i.e., transverse LSCS. Vicryl no 1 suture material was used to close the uterus and proline 2/0 to close the skin in interrupted sutures. Patients were followed in the postnatal ward for febrile morbidity and wound infection till 3rd postoperative day and afterwards when they came for stitch removal. The laboratory markers like TLC and CRP were not used because of their uncertainty in diagnosing sepsis in the early stages and due to increased value in pregnancy and after operative delivery. All entries were done in the proforma.

Quantitative data like age was presented by mean and standard deviation. Qualitative data like fever and wound infection were presented by frequency and percentages. Chi-square test was used to see the significant differences in both groups. A P-value of less than or equal to 0.05 was taken as significant.

Results

A total of 240 cases were divided into two groups A & B consisting of 120 patients in each group were included in this study. Group A received a single dose of prophylactic antibiotic and Group B received the same 1 gm preoperative dose followed by two postoperative doses of 1gm I/V cefotaxime.

The age of patients ranged between 20-35 years. The mean age of the patients was 27.93±3.62 and 28.80± 3.54 years in groups A and B, respectively. In group A, the mean gestational age was 39.21±0.70 and in group B, 39.27±0.69 weeks. In group A, 9 patients (7.5%) and in group B, 11 patients (9.2%) were primigravida while 111 patients (92.5%) in group-A and 109 patients (90.8%) in group B were multigravida.

Febrile morbidity was found in 8 patients (6.7%) in group A and 6 patients (5.0%) in group B. (p=0.582) (Table-1). Postoperative wound infection was observed in 11 patients (9.2%) of group-A and 8 patients (6.7%) of group B (p=0.473) (Table-2).

Table 1: *Comparison of Febrile morbidity in both groups*

Febrile morbidity	Group-A (Single doses antibiotic prophylaxis)		Group-B (Multiple doses antibiotic prophylaxis)	
	No.	%	No.	%
Yes	8	06.7	6	05.0
No	112	93.3	114	95.0

Chi square = 0.303
P value = 0.582

Table 2: *Distribution of cases by post-operative wound infection.*

Postoperative wound infection	Group-A (Single dose antibiotic prophylaxis)		Group-B (Multiple dose antibiotic prophylaxis)	
	No.	%	No.	%
Yes	11	09.2	8	06.7
No	109	90.8	112	93.3

Chi square = 0.514
P value = 0.473

Discussion

Caesarean section is considered a safe mode of delivery in many circumstances, but the risks associated are post-operative infection which is now in increased trend due to underlying poor hygiene, less immunity in anaemic patients and increase obesity.[11] It is affecting more than 85 % of pregnant patients and healthcare providers are concerned to minimize this complication which is avoidable in many circumstances.[12] Due to the increasing trend of resistant bacteria, and poor response to broad-spectrum antibiotics, the role of multiple doses as antibiotics have been challenged in literature.[13] In many cases, a single-dose

antibiotic is now considered effective.[14] There is an additional risk of hospital-acquired infection from operation theatre and ward settings. The role of antibiotics as part of the surgical safety checklist by WHO is recommended, and that prophylaxis cannot be challenged.[15]

In the present study, a single dose of prophylactic antibiotic i.e., 1 gm intravenous cefotaxime after umbilical cord clamping has shown insignificant incidence of surgical-site infection (p=0.473) and febrile morbidity (p=0. 0.582) when compared to multiple doses. Our results are consistent with the following studies conducted earlier.[16,21]

Considering the additional risk factors, multiple doses can be offered as prophylaxis and showed no additional benefit of giving more than a single dose of antibiotics as prophylaxis. Antibiotics given at the time of surgical incision have broad spectrum coverage for microorganisms.[17] One study concluded that antibiotic prophylaxis given following the recommended way of prior incision has a significant role in the reduction of postoperative morbidity and reduction in neonatal chances of sepsis.[18] There is a proven role of a single dose, but meta-analysis showed no additional benefit of using multiple doses that is routine practice in low resource setting considering risk factors, hospital protocol and set standards against increased septic morbidity. Some studies also compared the seven-day prophylaxis with a single dose and found no significant difference in preventing post-operative wound infection.[19] Amenu et al studied the effect of antibiotic prophylaxis and concluded a better safety profile for multiple doses by also including patients with prolonged rupture of membranes that may have a biased effect on the results.[20] Satyanarayana et al concluded an increase trend of febrile morbidity in patients in his study but a significant difference was that his team included emergency caesarean section.[21]

Conclusion

Despite the common practice of giving multiple doses of antibiotic prophylaxis in our clinical practice, our study showed no significant improvement in febrile morbidity and any increased incidence of wound infection in patients who received multiple or single-dose antibiotic prophylaxis.

Conflict of Interest: *None*

Funding Disclosure: *None*

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Authors Contribution

KW: Conceptualization of study, Data Collection
NB, AA: Literature Search
AA: Statistical Analysis
NB, TR: Writing of Manuscript, Drafting, Revision

All authors are equally accountable for accuracy, integrity of all aspects of the research work.